

developed by spraying an aqueous 1% sodium carbonate solution at 30°C for 100 seconds. The number of remaining steps in the step tablet was counted. The results are shown in Table 5. Further, the sample was heated at 150°C for 45 minutes and exposed to ultra-violet ray at 3J/cm² to prepare a cover lay.

The cover lay sample was assayed on flexibility to determine whether it was folded at a bend angle of 180° to get a cracking trouble or not. The sample was assayed on soldering-heat resistance to determine whether it was soldered at 260°C for 10 seconds by the rosin type crack MH-820V (trade name, made by Tamura Kaken KK) to get a swelling trouble or not. The sample after soldering was again assayed on flexibility to determine whether it was folded at a bend angle of 180° to get a cracking trouble or not. The results are shown in Table 5.

Table 5

	The number of remaining steps	Soldering heat resistance (260°C, 10sec)	Folding (180°)	
			before soldering	after soldering
Example 21	9	good	good	good
Comparative Example 6	8	good	cracking	cracking

The results of Example 21 and Comparative Example 6 reveal that the photosensitive resin composition of the present invention can provide a cover lay that is good in both soldering-heat resistance and folding (flexibility).

Industrial Applicability

The resin composition of the present invention can be diluted with water and is excellent in curing-physical property (curing, adhesion, pencil hardness, and water resistance). The resin composition is suitable for a solder resist and an interlayer dielectric layer, because it allows a development with an organic solvent or a dilute alkali solution and the cured product is excellent in flexibility, soldering-heat resistance, heat-deterioration resistance and nonelectrolytic gold-plating resistance. The resin composition is suitable for a solder resist for a printed circuit board, especially a flexible printed circuit board and an interlayer dielectric layer. Furthermore, the photosensitive resin composition and the photosensitive film of the present invention are suitable for the etching resist for FPC or the photosensitive film for a cover lay, because they are good to deal with and have excellent flexibility and soldering-heat resistance.

Claims

(1) An urethane oligomer(A) obtained by reacting a polyol compound(a) with a polybasic acid anhydride(b-1) having at least two acid anhydride groups per molecule, a polyisocyanate compound(c), and a hydroxy compound having ethylenically unsaturated groups and the salt thereof.

(2) An urethane oligomer(A) according to Claim (1), wherein said polybasic acid anhydride(b) having at least two acid anhydride groups per molecule has an acid value of 200-1500mgKOH/g and the salt thereof.

(3) An urethane oligomer(A) according to Claim (1) or (2), wherein said urethane oligomer(A) has a weight-average molecular weight of 1,000-100,000; and the salt thereof.

(4) An urethane oligomer(A) according to any of Claim (1) to (3), wherein said urethane oligomer(A) has an acid value of 1-200mgKOH/g and the salt thereof.

(5) A resin composition comprising an urethane oligomer(A) according to any of Claim (1) to (4) and an unsaturated group-containing polycarboxylic acid resin(B) that is a product obtained by reacting an epoxy resin (e) having at least two epoxy groups per molecule with a monocarboxylic acid compound(f) having ethylenically unsaturated groups and a polybasic acid anhydride(b-2).

(6) A resin composition according to Claim (5), wherein said epoxy resin (e) having at least two epoxy groups per molecule